Caruel (T.) Epitome Floræ Europæ. Fasc. 1. Monocotyledones. 8vo. *Florentiæ* 1892. The Author.

Fayrer (Sir J.), F.R.S. Presidential Address, International Congress of Hygiene and Demography, 1891. 8vo. *London* [1892]. The Author.

Roscoe (Sir H. E.), F.R.S., and C. Schorlemmer, F.R.S. A Treatise on Chemistry. Vol. III. Part VI. 8vo. *London* 1892. The Authors.

Map of England showing Lines of Equal Magnetic Declination for January 1, 1892. The Editor, 'Colliery Guardian.'

Reduced Photograph of Map showing the Points of Earthquake Frequency in New Zealand. Mr. George Hogben, Timaru.

February 18, 1892.

The LORD KELVIN, D.C.L., LL.D., President, in the Chair.

A List of the Presents received was laid on the table, and thanks ordered for them.

The following Papers were read:—

I. "The Nature of the Shoulder Girdle and Clavicular Arch in Sauropterygia." By H. G. SEELEY, F.R.S. Received January 18, 1892.

[Publication deferred.]

II. "On the Origin from the Spinal Cord of the Cervical and Upper Thoracic Sympathetic Fibres, with some Observations on White and Grey Rami Communicantes." By J. N. LANGLEY, M.A., F.R.S., Fellow and Lecturer of Trinity College, Cambridge. Received January 20, 1892.

(Abstract.)

The experiments of which an account is given in this paper were made upon anæsthetised cats, dogs, and rabbits. The lower cervical and upper thoracic nerves were tied, cut, and stimulated in the

vertebral canal, and the effects of the stimulation observed. The results were as follows:—

None of the lower cervical nerves produces any of the effects which can be produced by stimulating the upper thoracic or cervical sympathetic; *i.e.*, the lower cervical nerves send no efferent visceral fibres to the sympathetic.

The *pupil* receives dilator fibres from the 1st, 2nd, and 3rd thoracic nerves. The relative effect of these nerves upon the pupil varies somewhat in different animals of the same species, and varies considerably in animals of different orders. In the cat and dog, both the 1st and 2nd thoracic nerves cause great dilation of the pupil; in the cat, as a rule, the 1st produces greater dilation than the 2nd thoracic, but this is not always the case, and sometimes the 2nd is more powerful than the 1st thoracic nerve; the 3rd thoracic nerve has a comparatively slight action, and the extent of its action varies: in some cases the dilation produced by it is readily observed, in others it requires special attention. In the rabbit, the 2nd thoracic nerve is the chief dilator nerve for the pupil; the 3rd thoracic nerve produces a considerable dilation, but less promptly than the 2nd; the 1st thoracic has the least action of the three, and in some cases has a very slight effect.

The nerve-fibres causing *retraction of the nictitating membrane and opening of the eyelids* have in the dog and rabbit the same origin as the dilator fibres for the pupil. In the cat, their origin is somewhat more extended; a few fibres arise from the 4th thoracic nerve, and occasionally a very few from the 5th thoracic nerve.

The *vaso-motor fibres for the head** arise in the cat from the first five thoracic nerves, in the dog from the first four, and probably to a slight extent also from the 5th. The 1st thoracic nerve has a slight to moderate vaso-motor effect in the dog, a less and inconstant effect in the cat; the 2nd and 3rd thoracic nerves cause complete and rapid constriction of the small arteries on the same side of the head; the 4th thoracic also causes complete contraction, but more slowly than either the 3rd or the 2nd: in the dog its effect is less than in the cat; the 5th thoracic nerve has in the cat a distinct though less effect than the 4th; in the dog its action is doubtful.

In the rabbit, the vaso-motor nerves for the ear arise from the 2nd to the 8th thoracic nerves inclusive; the 5th nerve has usually the most rapid effect; passing upwards or downwards, the effect decreases; the 2nd and 8th nerves usually cause complete constriction in a part only of the auricular artery.

The *secretory fibres for the sub-maxillary gland* of the cat and dog have the same origin as the vaso-motor fibres for the head. The 2nd thoracic causes secretion more readily than any other nerve.

* Certain parts only of the head have been observed.

The *cardiac accelerator fibres* arise in the cat from the first four or five thoracic nerves; the maximum effect is obtained sometimes from the 2nd and sometimes from the 3rd thoracic nerve; the 1st and the 4th thoracic nerves have in some animals a considerable accelerator action, in others little or none; the 5th nerve appears occasionally to contain a few accelerator fibres, but further evidence is desirable.

Taking into account the pilo-motor fibres of the cat and dog, it is seen that the cervical sympathetic arises in these animals from the first seven, and in the rabbit from the first eight, thoracic nerves; the 1st thoracic is, however, less represented in the cervical sympathetic of the rabbit than it is in that of the cat and dog.

Comparing the rabbit with the cat and dog, as regards sympathetic fibres, which are present in all, it results that in the cat and dog the fibres of any one kind are higher in origin, and in some cases present in fewer spinal nerves, than they are in the rabbit. In accordance with this, the 2nd thoracic more frequently causes a movement of the fore-foot in the rabbit than in the other two animals. On the whole, the sympathetic fibres of any one kind appear to be slightly higher in the dog than in the cat.

The uppermost white ramus communicans arises from the 1st thoracic nerve; the lowest in the dog and cat arises usually, as described by Gaskell, from the 4th lumbar nerve; occasionally, however, the 5th lumbar nerve gives off a white ramus to the sympathetic. Both in the upper and lower regions of the spinal cord, there is satisfactory experimental evidence of efferent sympathetic fibres in those spinal nerves which have white rami, and in those only. This is in agreement with the views of Gaskell.

In the grey rami, medullated fibres of greater diameter than 4 μ—and, perhaps, some of the smaller ones—are probably afferent fibres, which pass to the spinal cord by the white rami.

A comparison of the histological characters and of the reflex effects yielded by various parts of the sympathetic, by the depressor, and by the nervus erigens, affords strong evidence that a considerable number of the medullated fibres of larger diameter than 4 μ, although afferent, are not fibres of general sensibility.

In the course of the paper the results of previous observers are given and discussed.

III. "On the Relative Densities of Hydrogen and Oxygen. II." By Lord Rayleigh, Sec. R.S. Received February 5, 1892.

In a preliminary notice upon this subject,* I explained the procedure by which I found as the ratio of densities 15·884. The

* 'Roy. Soc. Proc.,' vol. 43, p. 356, February, 1888.